

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	14.000	Minimum Backdrop Height (m)	9.000
Ratio-R	0.200	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
10	0.062	5.00	136.970	1800	400652.886	340397.956	2.130
11	0.074	5.00	136.830	2400	400648.547	340412.218	2.400
12	0.170	5.00	136.900	2400	400644.744	340426.146	2.570
13			136.600	3000	400635.730	340426.097	2.614
14			134.450	1200	400599.841	340422.507	1.014

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	10	11	14.907	0.600	134.840	134.730	0.110	135.5	900	5.04	34.3
1.001	11	12	14.438	0.600	134.430	134.330	0.100	144.4	1200	5.25	33.9
2.000	12	13	9.014	0.600	134.330	133.986	0.344	26.2	1200	5.27	33.8
1.002	13	14	36.068	0.600	133.986	133.436	0.550	65.6	300	5.58	33.2

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	2.689	1711.0	5.8	1.230	1.200	0.062	0.0	37	0.648
1.001	3.111	3518.6	12.5	1.200	1.370	0.136	0.0	51	0.769
2.000	7.321	8279.4	28.0	1.370	1.414	0.306	0.0	49	1.780
1.002	1.944	137.4	27.5	2.314	0.714	0.306	0.0	91	1.528

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	14.907	135.5	900	Circular_Default Sewer Type	136.970	134.840	1.230	136.830	134.730	1.200
1.001	14.438	144.4	1200	Circular_Default Sewer Type	136.830	134.430	1.200	136.900	134.330	1.370
2.000	9.014	26.2	1200	Circular_Default Sewer Type	136.900	134.330	1.370	136.600	133.986	1.414
1.002	36.068	65.6	300	Circular_Default Sewer Type	136.600	133.986	2.314	134.450	133.436	0.714

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	10	1800	Manhole	Adoptable	11	2400	Manhole	Adoptable
1.001	11	2400	Manhole	Adoptable	12	2400	Manhole	Adoptable
2.000	12	2400	Manhole	Adoptable	13	3000	Manhole	Adoptable
1.002	13	3000	Manhole	Adoptable	14	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
10	400652.886	340397.956	136.970	2.130	1800		0	1.000	134.840	900
11	400648.547	340412.218	136.830	2.400	2400		1	1.000	134.730	900
12	400644.744	340426.146	136.900	2.570	2400		0	1.001	134.430	1200
13	400635.730	340426.097	136.600	2.614	3000		1	2.000	133.986	1200
14	400599.841	340422.507	134.450	1.014	1200		0	1.002	133.986	300
							1	1.002	133.436	300

Simulation Settings

Rainfall Methodology	FSR	Skip Steady State	✓
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	14.000	Additional Storage (m³/ha)	20.0
Ratio-R	0.200	Check Discharge Rate(s)	✓
Summer CV	0.750	Check Discharge Volume	✓
Winter CV	0.840	100 year 360 minute (m³)	
Analysis Speed	Normal		

Storm Durations

15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
100	40	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	1.95
Greenfield Method	IH124	Growth Factor 100 year	2.48
Positively Drained Area (ha)		Betterment (%)	0
SAAR (mm)		QBar	
Soil Index	1	Q 1 year (l/s)	
SPR	0.10	Q 30 year (l/s)	
Region	1	Q 100 year (l/s)	
Growth Factor 1 year	0.85		

Pre-development Discharge Volume

Site Makeup	Greenfield	Return Period (years)	100
Greenfield Method	FSR/FEH	Climate Change (%)	0
Positively Drained Area (ha)		Storm Duration (mins)	360
Soil Index	1	Betterment (%)	0
SPR	0.10	PR	
CWI		Runoff Volume (m ³)	

Node 13 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	133.986	Product Number	CTL-SHE-0088-3700-1200-3700
Design Depth (m)	1.200	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	3.7	Min Node Diameter (mm)	1200

Node 13 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	135.500
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	256

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	65.0	0.0	0.800	65.0	0.0	0.801	0.0	0.0

Results for 1 year Critical Storm Duration. Lowest mass balance: 90.60%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	10	10	134.876	0.036	4.9	0.1113	0.0000	OK
120 minute winter	11	90	134.636	0.206	5.4	1.0572	0.0000	OK
120 minute winter	12	92	134.632	0.302	14.8	1.7674	0.0000	OK
120 minute winter	13	92	134.632	0.646	10.6	4.5691	0.0000	SURCHARGED
15 minute summer	14	1	133.436	0.000	3.7	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	10	1.000	11	4.7	0.607	0.003	0.1166	
120 minute winter	11	1.001	12	7.3	0.539	0.002	2.5251	
120 minute winter	12	2.000	13	10.6	0.542	0.001	3.7908	
120 minute winter	13	Hydro-Brake®	14	3.7				31.3

Results for 30 year Critical Storm Duration. Lowest mass balance: 90.60%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	10	272	135.459	0.619	3.3	1.9353	0.0000	OK
360 minute winter	11	264	135.459	1.029	7.3	5.2888	0.0000	OK
360 minute winter	12	264	135.461	1.131	17.8	6.6101	0.0000	OK
360 minute winter	13	272	135.455	1.469	21.6	10.3813	0.0000	SURCHARGED
15 minute summer	14	1	133.436	0.000	3.7	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute winter	10	1.000	11	2.8	0.577	0.002	7.5643	
360 minute winter	11	1.001	12	6.3	0.480	0.002	15.3721	
360 minute winter	12	2.000	13	21.6	0.309	0.003	10.0388	
360 minute winter	13	Hydro-Brake®	14	4.1				119.1

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 90.60%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	10	368	136.530	1.690	4.3	5.2854	0.0000	SURCHARGED
480 minute winter	11	360	136.529	2.098	13.7	10.7884	0.0000	SURCHARGED
480 minute winter	12	368	136.529	2.199	32.7	12.8593	0.0000	SURCHARGED
480 minute winter	13	360	136.527	2.541	30.4	70.0242	0.0000	FLOOD RISK
15 minute summer	14	1	133.436	0.000	3.7	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
480 minute winter	10	1.000	11	8.7	0.577	0.005	9.4477	
480 minute winter	11	1.001	12	21.0	0.454	0.006	16.2674	
480 minute winter	12	2.000	13	30.4	0.312	0.004	10.1562	
480 minute winter	13	Hydro-Brake®	14	5.2				182.4